

LISTING OF THE CLAIMS

This listing of the claims replaces all prior versions and listings of the claims in the Subject Application:

1. *(Previously Presented)* A method for making a ferritic stainless steel article having an oxidation resistant surface, the method comprising:
providing a ferritic stainless steel comprising 0.2 to 1.0 weight percent aluminum, at least one rare earth metal and 16 to less than 30 weight percent chromium, wherein the total weight of rare earth metals is from 0.02 to 1.0 weight percent; and
electropolishing at least one exposed surface of the ferritic stainless steel,
so that, when subjected to an oxidizing atmosphere at high temperature, the exposed electropolished surface develops an electrically conductive, aluminum-rich, oxidation resistant oxide scale comprising chromium and iron and having a hematite structure differing from Fe_2O_3 , $\alpha\text{-Cr}_2\text{O}_3$, and $\alpha\text{-Al}_2\text{O}_3$.
2. *(Previously Presented)* The method of claim 1, wherein lattice parameters a_0 and c_0 of the oxide scale differ from a_0 and c_0 of Fe_2O_3 , $\alpha\text{-Cr}_2\text{O}_3$, and $\alpha\text{-Al}_2\text{O}_3$.
3. *(Previously Presented)* The method of claim 1, wherein the at least one exposed electropolished surface develops the oxide scale when heated in an oxidizing atmosphere at a temperature in the range of 750°C to 850°C.
4. *(Previously Presented)* The method of claim 1, wherein the at least one exposed electropolished surface develops the oxide scale when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C.

5. *(Original)* The method of claim 1, wherein the oxide scale is characterized by lattice parameters a_o in the range of 4.95 to 5.04 Å and c_o in the range of 13.58 to 13.75 Å.

6. *(Withdrawn)* The method of claim 1, wherein the oxide scale is characterized by nominal lattice parameters $a_o = 4.98$ Å and $c_o = 13.57$ Å.

7. *(Canceled)*

8. *(Canceled)*

9. *(Previously Presented)* The method of claim 1, wherein the exposed electropolished surface develops the oxide scale when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C, and wherein the oxide scale is characterized by a_o in the range of 4.95 to 5.04 Å and c_o in the range of 13.58 to 13.75 Å.

10. *(Previously Presented)* A method for making a ferritic stainless steel article having at least one oxidation resistant surface, the method comprising:
providing a ferritic stainless steel comprising 0.2 to 1.0 weight percent aluminum, at least one rare earth metal and 16 to less than 30 weight percent chromium, wherein the total weight of rare earth metals is from 0.02 to 1.0 weight percent; and
electropolishing at least one exposed surface of the ferritic stainless steel,
so that the exposed electropolished surface develops an aluminum-rich oxide scale when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C, the oxide scale comprising iron and chromium and having a hematite structure, a_o in the range of 4.95 to 5.04 Å, and c_o in the range of 13.58 to 13.75 Å.

11. *(Previously Presented)* A method for making a ferritic stainless steel article having an uncoated electropolished oxidation resistant surface, the method comprising:

providing a ferritic stainless steel comprising 0.2 to 1.0 weight percent aluminum, at least one rare earth metal and 16 to less than 30 weight percent chromium, wherein the total weight of rare earth metals is from 0.02 to 1.0 weight percent; and electropolishing at least one exposed surface of the ferritic stainless steel.

12. *(Canceled)*

13. *(Previously Presented)* The method of claim 11, wherein the at least one exposed electropolished surface develops an aluminum-rich oxide scale comprising iron and chromium and having a hematite structure, a_0 in the range of 4.95 to 5.04 Å, and c_0 in the range of 13.58 to 13.75 Å, when heated in an oxidizing atmosphere for at least 100 hours at a temperature in the range of 750°C to 850°C.

14. *(Withdrawn)* The method of claim 11, wherein the ferritic stainless steel comprises 16 up to 19 weight percent chromium.

15. *(Canceled)*

16. *(Previously Presented)* The method of claim 11, wherein the ferritic stainless steel comprises 0.4 up to 0.8 weight percent aluminum.

17. *(Canceled)*

18. *(Previously Presented)* The method of claim 11, wherein the ferritic stainless steel comprises at least one metal selected from the rare earth metals cerium, lanthanum, and yttrium, and the transition metal hafnium.

19. *(Canceled)*

20. *(Previously Presented)* The method of claim 11, wherein the ferritic stainless steel comprises, in weight percent, 18 up to 22 chromium, 0.4 to 0.8 aluminum, and 0.02 to 0.2 rare earth metal.

21. *(Previously Presented)* The method of claim 11, wherein the ferritic stainless steel further comprises, in weight percent, up to 3 nickel, up to 3 manganese, up to 0.7 silicon, up to 0.07 nitrogen, up to 0.07 carbon, and up to 0.5 titanium.

22. *(Previously Presented)* The method of claim 11, wherein the ferritic stainless steel comprises, in weight percent, about 22 chromium, about 0.6 aluminum, cerium, and lanthanum, wherein the sum of the weights of cerium and lanthanum is up to about 0.10.

23. *(Withdrawn)* The method of claim 11, wherein the article is selected from the group consisting of a plate, a sheet, a strip, a foil, a bar, a fuel cell interconnect, high-temperature manufacturing equipment, high-temperature handling equipment, calcining equipment, glass making equipment, glass handling equipment, and heat exchanger components.

24. *(Withdrawn)* The method of claim 11, wherein the article is a fuel cell interconnect and the ferritic stainless steel comprises 16 to less than 30 weight percent chromium, 0.2-1.0 weight percent aluminum, and at least one rare earth metal, wherein the total weight of rare earth metals is greater than 0.02 up to 1.0 weight percent.

25. *(Previously Presented)* The method of claim 11, wherein electropolishing the at least one exposed surface of the ferritic stainless steel comprises:

placing the at least one exposed surface of the ferritic stainless steel in a bath containing an electropolishing solution and a cathode; and

passing a current between the ferritic stainless steel and the cathode so that material is removed from the at least one exposed surface of the ferritic stainless steel, thereby reducing surface roughness of the at least one exposed surface.

26. *(Previously Presented)* The method of claim 11, wherein electropolishing the at least one exposed surface improves resistance of the at least one exposed surface to oxidation when subjected to a temperature and an atmosphere characteristic of operating conditions within a solid oxide fuel cell.

27. *(Withdrawn)* The method of claim 11, wherein the at least one electropolished surface has oxidation resistance in air at 750°C characterized by a log k_p less than -9.1 g²/cm⁴h.

28. *(Withdrawn)* The method of claim 11, wherein the at least one electropolished surface has oxidation resistance in air at 850°C characterized by a log k_p less than -8.5 g²/cm⁴h.

29-98. *(Canceled)*

99. (*Currently Amended*) A method for making a ferritic stainless steel article having at least one oxidation resistant surface, the method comprising:

electropolishing at least one exposed surface of a ferritic stainless steel comprising 0.4 to 0.8 weight percent aluminum, 18 to 22 weight percent chromium, and 0.02 to 0.2 weight percent rare earth metals, wherein the rare earth metals are selected from the group consisting of cerium, lanthanum, praseodymium, and combinations of any thereof;

wherein the electropolishing chemically modifies the at least one exposed surface of the ferritic stainless steel so that the electropolished exposed surface develops an aluminum-rich oxide scale when heated in an oxidizing atmosphere at a temperature in the range of 750°C to 850°C, the aluminum-rich oxide scale comprising iron and chromium and having a hematite structure, a_0 in the range of 4.95 to 5.04 Å, and c_0 in the range of 13.58 to 13.75 Å; and

wherein the exposed electropolished surface is uncoated.

100. (*Currently Amended*) The method of claim 99, further comprising ~~heating the at least one exposed surface of~~ the ferritic stainless steel article in an oxidizing atmosphere at a temperature in the range of 750°C to 850°C, wherein the exposed electropolished surface develops an aluminum-rich oxide scale comprising iron and chromium and having a hematite structure, a_0 in the range of 4.95 to 5.04 Å, and c_0 in the range of 13.58 to 13.75 Å.

101. (*Previously Presented*) The method of claim 99, wherein the electropolishing decreases the rate of oxidation of the ferritic stainless steel by at least one order of magnitude when compared to a non-electropolished sample of the same ferritic stainless steel, when heated in an oxidizing atmosphere at a temperature in the range of 750°C to 850°C.